

Notice of Allowability

Application No.

10/618,374

Examiner

Eugene Lee

Applicant(s)

NARUI ET AL.

Art Unit

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 4/20/06.
2. ☒ The allowed claim(s) is/are 1-7, 12-15, 21 and 62.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some* c) ☐ None of the:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

EUGENE LEE
PRIMARY EXAMINER



DETAILED ACTION

Allowable Subject Matter

1. Claims 1 thru 7, 12 thru 15, 21, and 62 are allowed. The following is an examiner's statement of reasons for allowance: The references of record, either singularly or in combination, do not teach or suggest at least a back-illuminated image sensor comprising: a depletion prevention layer formed closer to said second-plane side than said charge accumulating units, the depletion prevention layer which prevents a depletion region around said charge accumulating units from reaching said second plane (claims 1-4).

Regarding claims 5, 21, and 62, the references of record, either singularly or in combination, do not teach or suggest at least a back-illuminated image sensor comprising: an invalid charge discharging unit which drives said charge transfer unit to discharge an invalid charge while said charge accumulating units accumulate said signal charges; said invalid charge discharging unit comprising a vertical transfer unit which, during the charge accumulating period, successively applies a transfer voltage to the transfer electrodes to discharge invalid charges out of the charge transfer unit.

Regarding claim 6, the references of record, either singularly or in combination, do not teach or suggest at least a back-illuminated image sensor comprising: a dark current suppressing unit which approximates a potential of the first-plane side of said charge transfer unit to a substrate potential to suppress dark current flowing in from said first-plane side, at least during predetermined period while said charge accumulating units accumulate said signal charges; said dark current suppressing unit comprising a vertical transfer unit which, during the charge accumulating period, successively applies a transfer voltage to transfer electrodes of the charge

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transfer unit by approximating the potential of the charge transfer unit to a substrate voltage, so that the dark current flowing into the charge transfer unit is suppressed as much as possible.

Regarding claim 7, the references of record, either singularly or in combination, do not teach or suggest at least a back-illuminated image sensor comprising: an excessive charge discharging unit which overflows an excessive charge into said charge transfer unit in a vertical direction, from the charge accumulating units on the second-plane side to the charge transfer unit on the first-plane side and drives said charge transfer unit to discharge said excessive charge, said excessive charge occurring due to exceeding a saturation charge amount of said charge accumulating units; said excessive charge discharging unit comprising a vertical transfer unit which during the charge accumulating period, successively applies a transfer voltage to transfer electrodes of the charge transfer unit to discharge invalid excessive charges out of the charge accumulating units.

Regarding claims 12-15, the references of record, either singularly or in combination, do not teach or suggest at least a back-illuminated image sensor comprising: a barrier region provided on at least a part of transport paths of said signal charges formed between said charge accumulating units and said charge transfer unit, the barrier region which creates a peak of a potential barrier to block progress of said signal charges when no charge is to be transported and ensures full transportation of said signal charges by eliminating the peak of said potential barrier by said charge transport unit when a charge is transported.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue

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fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

INFORMATION ON HOW TO CONTACT THE USPTO

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eugene Lee whose telephone number is 571-272-1733. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Parker can be reached on 571-272-2298. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Eugene Lee
June 16, 2006

**EUGENE LEE
PRIMARY EXAMINER**

